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ANNUAL REPORT

STATE WATER SURVEY DIVISION
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JUN 3 1968



DEPARTMENT OF WATER AND SEWERS
CITY OF CHICAGO • RICHARD J. DALEY • MAYOR

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1967 ANNUAL REPORT
DEPARTMENT OF WATER AND SEWERS
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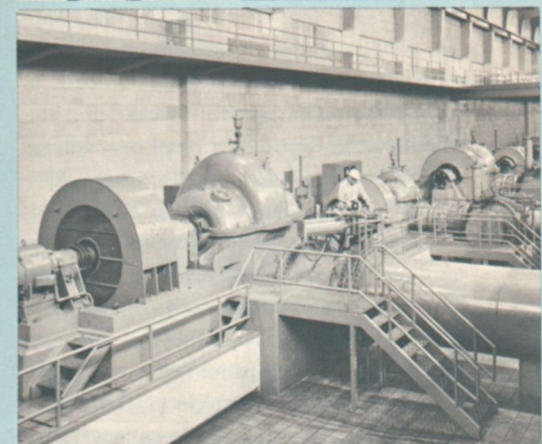
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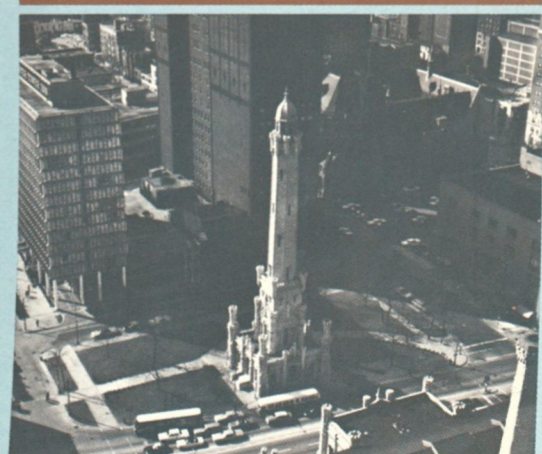
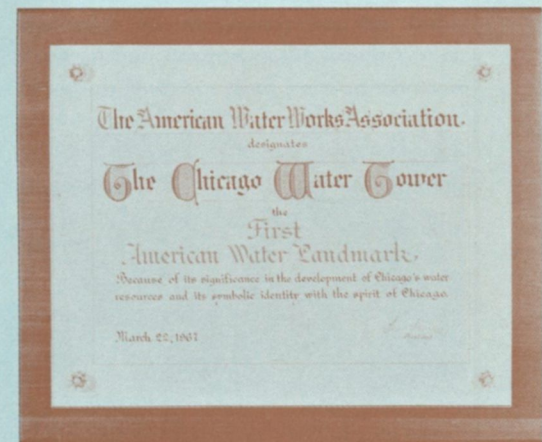
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HIGHLIGHTS

- A total of over 367 billion gallons of water was pumped through the water distribution system during 1967, an average daily pumpage of more than 1,005 million gallons.
- Total receipts of the Water Collection Division amounted to \$55,881,543.77 during the year. Of this amount, \$55,104,117.57 was collected from Water Fund revenue items.
- Investments for capital improvements in the Water System totaled \$11,813,453 in 1967. Programmed expenditures for capital improvements over the next five years total approximately \$67,015,000.
- The expanded facilities of Chicago's South Water Filtration Plant, dedicated on October 11, 1967, included the addition of two settling basins, 40 sand filters, two filtered water basins and a 150 million gallon-a-day pump. The plant now has the capability of processing 850 million gallons of water a day. This represents an increase of approximately 42 percent.
- The new Lake View Pumping Station was dedicated on November 14, 1967. The pumps at this new station are monitored and controlled remotely from a master panel located at the Thomas Jefferson Pumping Station, a little over two miles away.
- More than 17 miles of new water mains were placed in service in 1967, increasing the total number of miles of mains to over 4,107. 32.2 miles of sewers were constructed, bringing the total miles of sewers in the system to 4,057. Also, 1,768 new catch basins and 1,576 new manholes were added to the system.
- The Bureau of Sewers survey forces ran 138 miles of precise levels to establish elevations of 64 new street grades, and 37 standard bench monuments.
- In an effort to reduce water pollution, the Bureau of Sewers, in 1967, expanded its program of sampling industrial waste discharges. Industries found to be violating the City's Industrial Waste Ordinance were notified to take remedial measures to ensure compliance with the Ordinance.
- Laboratory tests of water samples conducted during the year totaled 562,189, an average of more than 1,500 each day.
- Research was undertaken to find means of disposing of sediment and suspended matter removed from lake water at the two filtration plants.
- The Chicago Water System is entirely self-supporting and operates with no income from real estate or other taxes.
- The Bureau of Water's 1967 safety record revealed an accident frequency rate of only 54 percent of the latest published national average for water utilities, and the accident severity rate was 65 percent of the national average.
- Plans began in 1967 to convert the Bureau of Water's five steam pumping stations from the use of coal to natural gas as a primary source of fuel. This is being undertaken to minimize the amount of air pollution from this essential activity.
- Plans were completed to install a Telemetric Data Amassing System in the water distribution network to provide for the transmission to a central control board of water pressure and water flow information from approximately 250 locations within the 4,100 miles of water mains. The installation, which will be undertaken in two phases, is scheduled to begin in 1968.
- During the year, about 42,200 feet of cast iron feeder mains, from 36 inches to 48 inches in size, were cleaned and lined with cement. Cleaning and lining of old mains prolongs their life and increases the carrying capacity, reducing the need for new feeder main construction.
- Plans for the expansion and modernization of the Thomas Jefferson Pumping Station were made to meet expected increased water demands in the areas served by the station. Also, changes in the distribution system and the realignment of the pumping stations service areas, particularly that of the Mayfair Pumping Station, indicate the need for overall alteration of the Thomas Jefferson Station.
- New magnetic-drive water meters were installed. These will reduce repair costs and expedite the meter reading process.
- The installation, in the spring of 1967, of a net in front of the Central Water Filtration Plant intake screens again successfully eliminated the overloading and clogging of the screens with heavy accumulations of alewife. This was the second year the net was used to divert the live fish from the intakes.
- In February a comprehensive in-service training course was instituted for 200 supervisory personnel from the various organizational units of the Department. The training sessions are scheduled into May of 1968.



Above—Mayor Richard J. Daley, observed by Commissioner James W. Jardine, throws switch to start pumping operations at the new Lake View Pumping Station. Below—foreground, new 150 million gallon-a-day pump at the South Water Filtration Plant.



The American Water Works Association named Chicago's Old Water Tower as America's first water landmark.



Fifteen years have elapsed since the establishment of the Department of Water and Sewers on January 1, 1953. Since then the Department has kept pace with the steady growth of Chicago and with the corresponding increases in both demand for potable water and the need for collection of sanitary wastes and storm flows.

Actually, the progressive achievements of the Chicago Water System began 100 years earlier when, in 1853, the City's first municipally-owned water system went into operation with a steam-driven walking beam-type pump called "Old Sally." At that time, cast iron water mains replaced the old log pipes which had been used by a private water company. Since then, continuous improvement and development have provided not only for current but also for

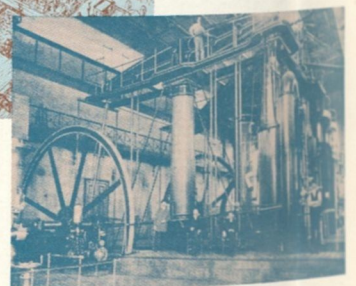
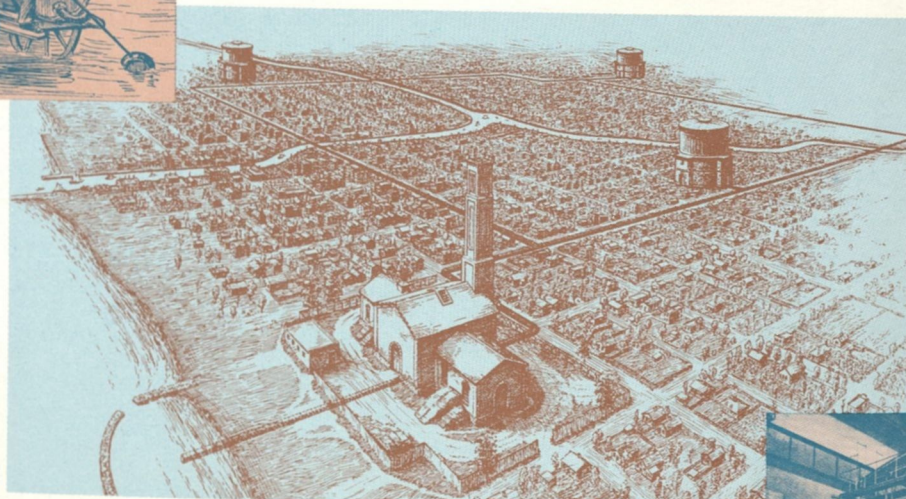
anticipated demands. The Chicago Water and Sewer Systems' many years of accomplishments and service have contributed vitally to the progress and development of the City.

During the past fifteen years, the Water and Sewer Systems have undergone numerous changes in an effort to achieve an ever-higher mode of efficiency. Among the most noteworthy accomplishments were the completion of the Central Water Filtration Plant and the expansion of the South Water Filtration Plant. Today, with the Central Water Filtration Plant in full operation and the South Water Filtration Plant's capacity increased from 600 million gallons a day to 850 million gallons a day, Chicago's Water System is capable, if required, of providing 2,600 million gallons a day. The completion of the Lake View Pumping Station during 1967 raised the total number of pumping stations in operation to eleven. Equipment for the control of its pumping units

consists of a Control Panel located at the Thomas Jefferson Pumping Station, from which the new station is ordinarily operated remotely. A set of controls was also installed in the Lake View Pumping Station. Signals transmitted to the Thomas Jefferson Pumping Station indicate water pressure, pumpage, and other important information. Other construction projects included the Southwest Pumping Station in 1963, and a 30 million gallon reservoir at the Western Avenue Pumping Station. Also, the 79th Street Tunnel was placed in operation, and the modernization of the Springfield Avenue and the Roseland Pumping Stations was completed. Throughout this period of time, the construction of new sewers and the installation of new water mains were in progress, and several new pumps were put into service at various pumping stations.

Further achievements were:

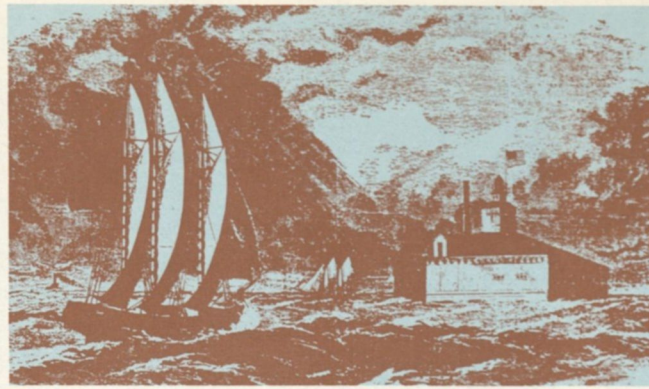
The Water Purification Division's adoption of the use of an electron micro-



Left—The water peddler of more than 100 years ago obtains his supply for City housewives. Above—The first Chicago Avenue Pumping Station and three reservoirs comprised the original municipal water supply system. Right—"Old Sally" was withdrawn from service in 1904, after having pumped water to Chicagoans for well over half a century.



This drawing shows the official inspection trip of the first under-the-lake brick water tunnel.



This first crib intake was constructed in 1865.



The major elements of the City's water intake system of 1869 are shown in this diagrammatic picture.

scope and new recording monitors for the detection of bacteria and radioactivity in water;

The start of the fluoridation process;

The beginning of chemical application control paced by water flow; and

The initiation of automated sequential backwash of sand filters.

Commendations presented to the Department of Water and Sewers during the fifteen year period include:

Awards of Honor from the American Water Works Association for ten consecutive years and from the National Safety Council and the American Society of Safety Engineers;

The Class One rating of the Chicago Water System by the National Board of Fire Underwriters, the Board's highest classification of adequacy and reliability, particularly in terms of ability to fulfill the vital, constant requirements for fight-

ing fires; and

Outstanding Engineering Accomplishment Award from the Illinois Society of Professional Engineers, in recognition of the construction of the Central Water Filtration Plant.

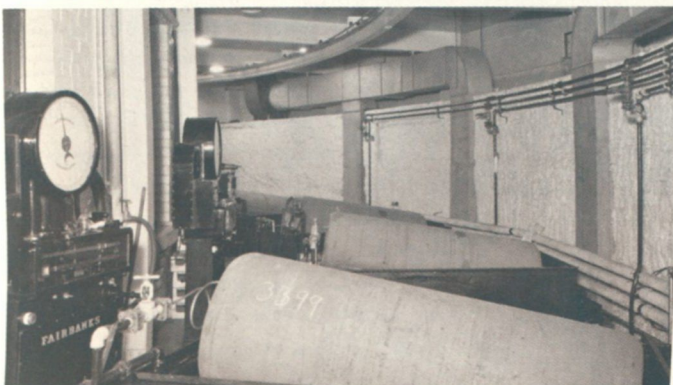
The Department is proud and pleased with these fifteen years of achievement, during which a total of \$423,131,966 has been invested for capital improvements in the water and sewer systems by constructing or improving filtration plant facilities, water mains, water tunnels, sewers, cribs and pumping stations and by developing purification procedures and purchasing new equipment.

The objectives of the Department of Water and Sewers have been, and continue to be, to furnish an adequate supply of potable water for the residents of Chicago and the constantly growing suburban areas, and to provide for surface drainage and collection of sanitary wastes. While the solution of the prob-

lem of water pollution, and more specifically, the pollution of Lake Michigan, the source of our water supply, is not solely the responsibility of this Department, the Department is vitally concerned with that problem. In spite of the growing pollution of Lake Michigan, the Chicago Water System continues successfully to furnish a high quality water to the public.

There is a close relationship between the operating costs of the Water System and the quality of the raw water available. As an illustration, the maximum carbon dosage at the South Water Filtration Plant has risen from an average of 14 pounds to 32 pounds per million gallons of water since 1953. Chlorine dosage at this Plant has increased from an average of 17 pounds to 24 pounds per million gallons of water. Activated carbon is used to eliminate undesirable tastes and odors, while chlorine is used to sterilize the water, that is to destroy bacteria.

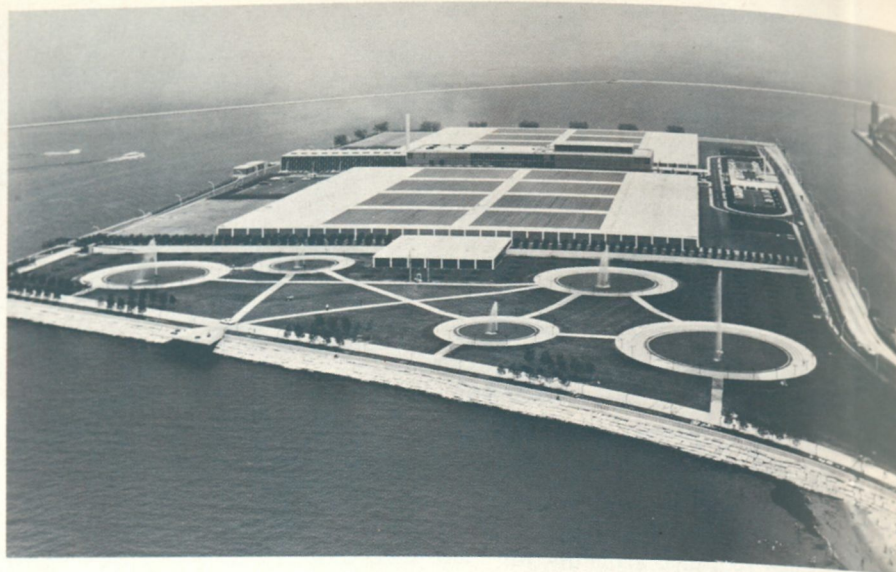
Early chlorination units used in Dunne Crib. Eventually all the City's water was chlorinated at the pumping stations, until 1967, when complete treatment became the function of the filtration plant.



Chicagoans lined up at the City's experimental filtration plant in 1934 to be among the first to take home pure, filtered water in containers.



The Central Water Filtration Plant, the World's largest facility of its kind, can filter and chemically treat more than a million gallons of water per minute.



Even though the addition of fluoride is not essential to purify water, it is added to the water at the Filtration Plants in Chicago in recognition of its accepted value as an effective aid in the prevention of dental caries in children.

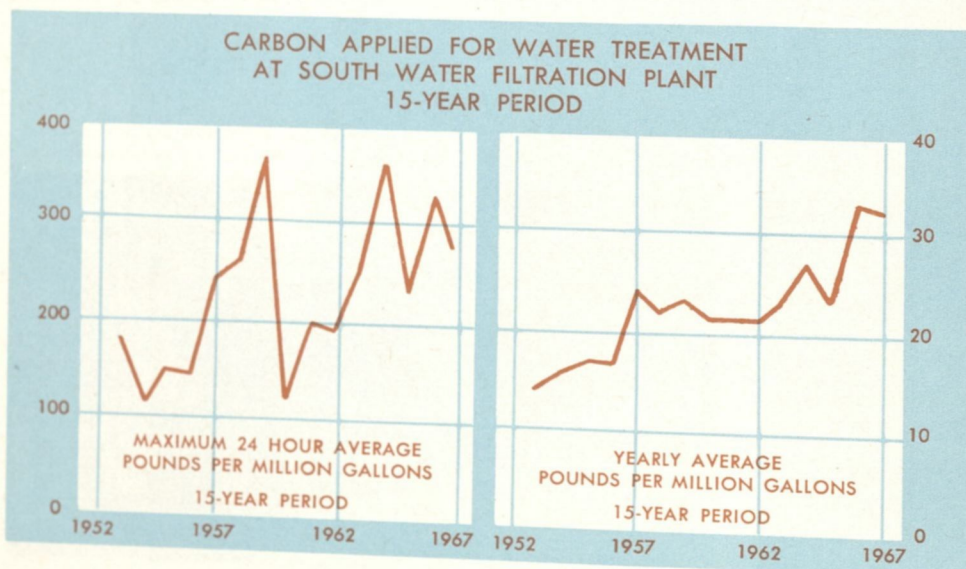
The menace of polluted water is by no means new. It did not begin with the increase in the population of Chicago, nor with the expansion of our Nation. Ever since human beings became numerous enough to congregate, the threat of pollution has existed. True, this problem has steadily grown for various reasons, some obvious, some obscure. However, solutions are being sought with encouraging results. Consider that it has been more than 67 years since the natural direction of flow of the Chicago River was reversed. The

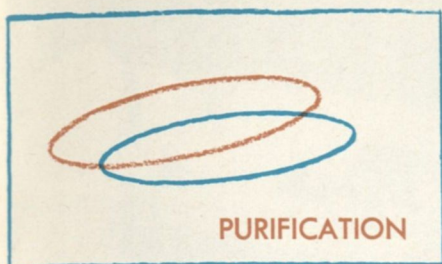
purpose of this remarkable engineering feat was to prevent pollutants from reaching the Lake.

Even though the water pollution problem has been with us for ages, it is only recently that it has been so frequently used as a subject for discussion and publication. But even with its notoriety, the term "pollution," in reference to water, is seldom defined. Very generally, any substance, which, when added to natural waters, causes that water to be harmful or diminishes its usefulness, could be called a pollutant. More specifically, water is considered to be polluted: when there has been discharged into that water sewage, industrial wastes or other wastes which could remove or decrease the oxygen normally dissolved in the water, or

which would promote the growth of undesirable plants or animals, or which would contain harmful or disease causing bacteria; when it contains solids which would be likely to settle and form sludge deposits, or oil, grease or floating solids which could cause an objectionable odor or appearance of the water's surface; or when it contains matter harmful to fish. Thus, it may be said that water pollution occurs when the normal properties of the water have been changed by the release of any solid, liquid or gaseous substance into that water in quantities large enough or frequently enough to create a nuisance or endanger public health, plant or animal life.

The Department of Water and Sewers is determined to set a good example in complying with all the requirements of legislation to eliminate pollution. Although the present procedures of returning settling basin sediment and filter-wash from the Filtration Plants to the Lake is believed to have no adverse effect on the quality of the Lake water, the Water Purification Division is currently searching for a better method of disposal. Moreover, the Department does not restrict its concern to the pollution of only water. In support of the City's anti-pollution program, plans have been made to convert the boiler equipment in the Water System's five steam-operated pumping stations to use gas fuel (with a secondary oil fuel) to eliminate any air pollution that may be caused by using coal as a fuel at these stations.





The growth of Chicago's Water System, which began in 1852 when the City issued \$400,000 in bonds partly to finance an eight million gallon-a-day pumper, is admirable when the System's history of achievements and rate of development are considered. This first pump, "Old Sally," supplied water for about 45,000 people.

The evolution of the purification processes of the Water System could be said to have started in 1912, when the sterilization treatment of the raw water with a hypochlorite solution was introduced at the intake cribs. By 1915, all the City's water was being chlorinated at the pumping stations. The vital need for such action became obvious during the latter part of the nineteenth century, when so many Chicagoans died of typhoid fever and other water-borne diseases. During 1891, 174 persons per 100,000 population died from such diseases. By 1917, that rate had dropped to two per 100,000.

Some forty years ago, extensive research in water purification was carried on at an experimental water filtration plant, the results of which are evidenced by Chicago's two modern water filtration plants in operation today.

The South Water Filtration Plant began full operations in May of 1947, with a peak capability of processing 600 million gallons a day. The plant site covers an area of approximately thirty-eight acres. Early in 1960, when heavier demands were placed on this plant and further increases were anticipated, it was decided to increase the plant peak capacity to 850 million gallons a day. The first phase of the work involved in the expansion of the South Water Filtration Plant was started during 1961, and construction work and landscaping were completed in 1967. Now, after its enlargement, the plant is equipped with five settling basins, 120 sand filters and six filtered water basins. Chemical storage facilities for carbon, alum and ferrous sulphate were also increased by the expansion. Other improvements were a security fence and gatehouse, a new entrance to the administration building, and newly-landscaped grounds. The new structure covers an area of $7\frac{3}{4}$ acres.

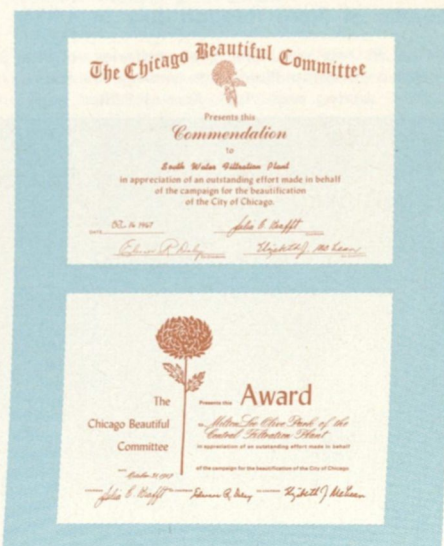
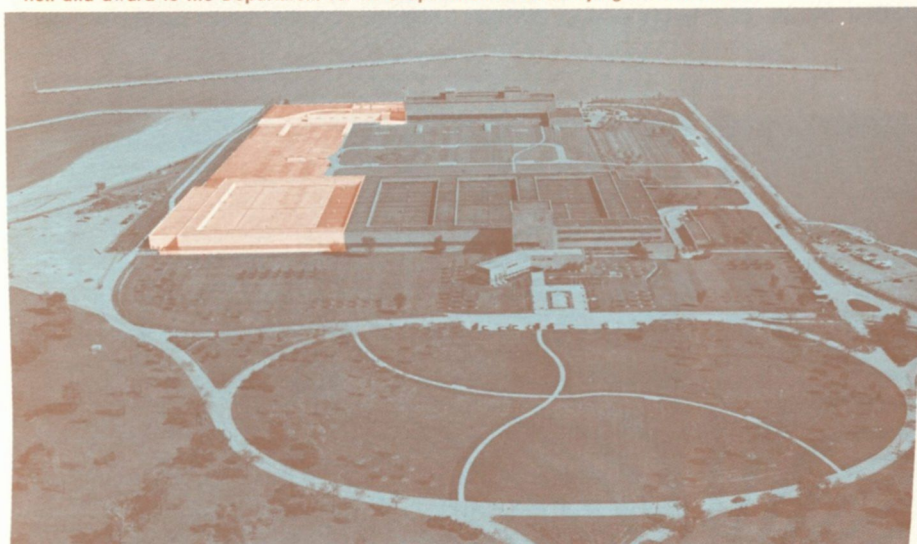
Now the South and Central Water Filtration Plants supply some 4,636,000 people with over one billion gallons of

safe, fluoridated, clear potable water each day. About 1.9 million of these consumers rely upon the South Water Filtration Plant. In the last fifteen years, a total of \$115,398,383 was invested in capital improvements for purification facilities.

The Purification Division has been concerned about the steady decline in the quality of raw water at the plants' intakes in Lake Michigan. Since early 1965, technical personnel have spent an ever-increasing amount of time surveying raw water in the southern end of the Lake and the tributary streams, and collecting data to assist the federal, state and local pollution control agencies in solving pollution problems. Such information is useful for comparison over periods of time and determining trends.

At a conference, convened by the Federal Water Pollution Control Administration and held in Chicago during March of 1965, reports on the degree and nature of pollution were made by several groups that were interested and involved. On this occasion, the Department of Water and Sewers presented data on quality of water in Lake Michigan and its tributaries, based on over twenty years of regular surveys conducted by the Water Purification Division. Following this conference, a Technical Advisory Committee was formed to establish criteria for the evaluation of

Left—The expansion of the South Water Filtration Plant, completed in 1967, is indicated at left. Right—The Chicago Beautiful Committee presented the commendation and award to the Department for its cooperation in beautifying the lakefront.

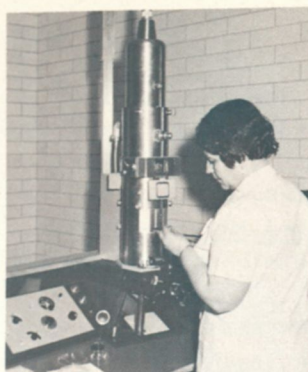


the quality of this water, and during January of 1966, these criteria were adopted by the conferees representing Illinois, Indiana and the Federal Water Pollution Control Administration at a meeting held for that purpose. Since then, concern over the pollution problem has grown rapidly.

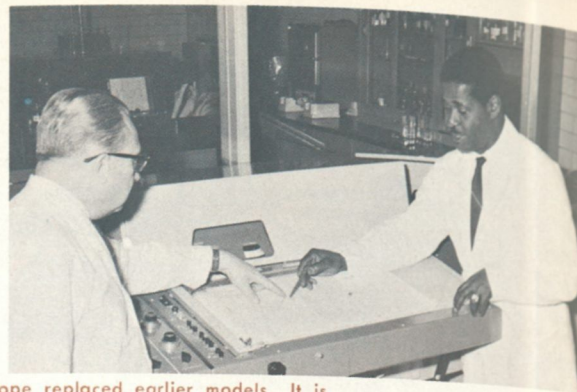
Since millions of people rely upon the Chicago Water System for their domestic water supply, it necessarily follows that the Department is vitally interested in the quality of Lake Michigan water, the source of this supply. The increase in chemical dosage and related cost figures becomes quite impressive when it is considered that the System furnishes an average of over one billion gallons of water each day. In spite of the additional problems created by water pollution, the Department found no need to request an increase in staff. Efficiency continued to be maintained by means of organizational changes, job duty reassignments, the revision of water sampling methods, and the improvement of techniques and equipment.

Prior to 1966, the Department experienced considerable difficulties with the heavy, and highly publicized, accumulations of alewife on the intake screens at the Central Water Filtration Plant during the spring and summer months. The problem reached the climactic stage in the spring of 1965. After much deliberation, it was decided to install a net in front of the Plant intakes with the hope of diverting fish movements. The net was in place during the months of April through July in 1966,

One of two new filter pipe galleries, at the South Water Filtration Plant, with piping for backwashing filter beds and for normal filter operations.



Left—This new electron microscope replaced earlier models. It is used in the detection of bacteria and can magnify 32,000 times actual size. Right—The new infra-red spectrophotometer is one of the instruments used in the determination of organic pollutants.



and, because it was used successfully the first time, it was installed again for the same period of 1967. Encouraged by the two-year record of completely eliminating the overloading and clogging of the Plant's water intake screens, the Department intends to use the net again in 1968 for the April - July period, when alewife runs are expected to be heavy. Also, the raw water tunnel connection from the Dever Crib to the Central Water Filtration Plant is scheduled to be completed in 1968, thus providing a second raw water supply source for the Plant. The use of both plant and crib intakes will insure an even more dependable operation.

A total of 562,189 laboratory tests of water samples were made in 1967, and the new electron microscope was used for 4,986 examinations during the year. Each Filtration Plant maintains a control laboratory to assist in the control of the treatment processes in accordance with the variance in the raw water quality. The Control Laboratory is staffed twenty-four hours a day. Water

samples are taken from Lake Michigan, the Calumet River System, intake cribs, pumping stations and the distribution system by the Water Quality Surveillance Section and tested by the chemical and bacteriological laboratories.

In addition to the operation of the two water filtration plants and laboratory facilities, the Water Purification Division: fulfilled responsibilities of insuring that water mains, tunnels and shafts were properly sterilized; kept channel dredging and dumping operations under surveillance; reviewed plans and recommended improvements for suburban water system facilities, and made statistical studies of field data. In this manner, the Division insured the delivery of a safe potable water to consumers.

During the year, more than 367 billion gallons of water were treated and supplied to the pumping stations. A total of 43,626 tons of chemicals were used in the treatment process to guarantee that the final product be of the highest quality and sparkling clarity.

Operating engineer at the South Water Filtration Plant checks filter-operating console which controls the filtering and backwashing processes.





PUMPING



A diver descends into the access shaft of the Tunnel leading from the Wilson Avenue Crib to install a bulkhead. Water passing to North Side consumers now comes through the Central Water Filtration Plant.

The operation and maintenance of eleven pumping stations, four water intake cribs and the water supply tunnels and shafts of the Chicago Water System are the responsibility of the Pumping Station Operation Division. Prior to the end of the year, one of the functions of the pumping stations was to add supplementary doses of chlorine to the water pumped through the various stations. Now chlorine is added to the water only at the Filtration Plants. Telephone reports from the pumping stations provided the Control Centers of the Filtration Plants with hourly information on the quantity of water pumped by each station. Chlorine residual and general water-quality tests are made regularly with water as it leaves the stations on its way to the consumers.

At the Water Filtration Plants, water, after passing through the intake screens, is raised to a level sufficient to permit gravity flow through the Filtration Plants and through the water tunnels supplying the eleven pumping stations. These stations in turn provide the pressure

necessary for the water to reach its ultimate destination through the distribution system.

Of the eleven pumping stations currently in operation, five are powered by steam and the other six by electricity. These stations are strategically located, so that if a station which relies upon electricity is cut off from that source of power, another station that is powered by steam will be able to compensate by increased pumpage.

During 1967, a total of 367,003 million gallons of water was pumped by the eleven stations, amounting to a daily average of about 1,005 million gallons.

The new Lake View Pumping Station was completed during 1967, and dedicated on November 14, to become the eleventh pumping station in operation. The new station is electrically powered and is used mainly during peak demand periods, rather than on a continuous basis. Since it is remotely-operated from the Thomas Jefferson Pumping Station, there is no operational staff

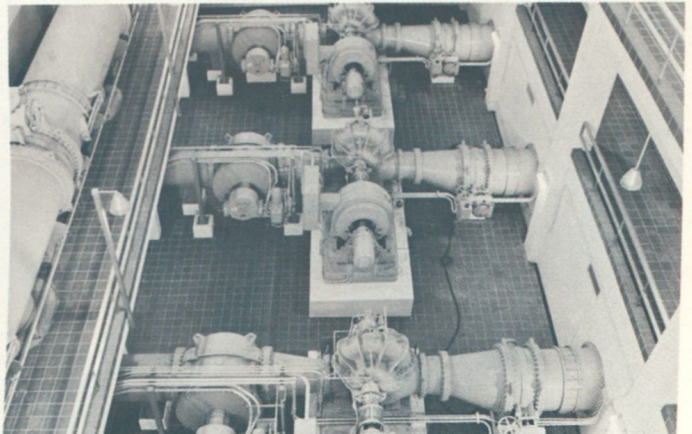
assigned to the Lake View Station. The rated pumping capacity of the new station is 105 million gallons per day, increasing the total installed pumping capacity of the system to 2,995 million gallons per day. Space was also provided for a fourth pump whenever such an addition may be deemed advisable. The new station building is attractively designed, and the landscaping adds beauty to the neighborhood in which the station is located. In the last fifteen years a total of \$79,069,757 was invested in capital improvements for pumping stations, cribs and water tunnels.

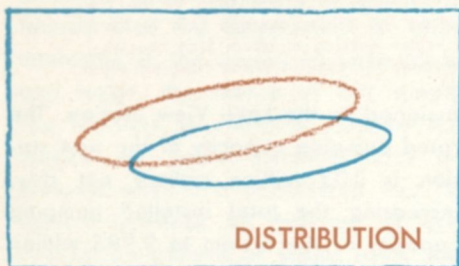
The Pumping Station Operation Division is responsible for the operation of the four active and stand-by intake cribs, and 72.3 miles of water supply tunnels, from six feet in diameter to twenty feet high. It is worthy to note that 100 years have passed since the completion of the first water supply tunnel, which carried water from the Two Mile Crib to the Chicago Avenue Pumping Station, then known as the North Pumping Works.

The Lake View Pumping Station, the most modern in the City's vast supply system, is located on Wilson Avenue, between Clarendon Avenue and Marine Drive.



These new pumps at the Lake View Pumping Station raised the system's total installed pumping capacity to 2,995 million gallons a day.





A side connection is installed on a 36-inch water main. Chicago's water distribution system is a network of interconnected, valve-controlled mains. More than 17 miles of new water mains were installed during 1967.

The Water Distribution Division plans, designs and constructs new water mains and maintains a distribution system of over 4,107 miles of pipe, about 45,744 fire hydrants and 42,414 valves. Expenditures of more than 67 million dollars have been scheduled for the next five years to include costs for permanent improvements in the water main distribution system. This program, which is based on carefully detailed planning, will provide the necessary facilities to keep the distribution network geared to the water supply demands of the future.

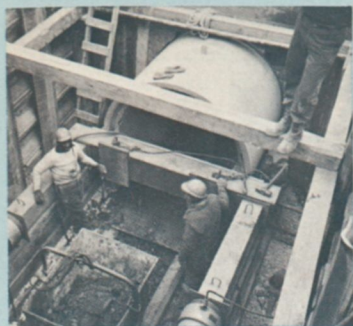
When comparing the water distribution system of today with that of early Chicago, the difference is almost unbelievable. In 1834, a public well was set up at Hubbard Street and Wabash Avenue. Water was obtained from this well by individual consumers and transported in buckets to their homes. As the population of the young City increased,

a pipe-line became necessary. In 1840, the Chicago City Hydraulic Company, a private organization which obtained a franchise to supply water, established a water pumping station and a distribution system consisting of several thousand feet of wooden water pipes — hollow logs with a bore of from two to six inches in diameter.

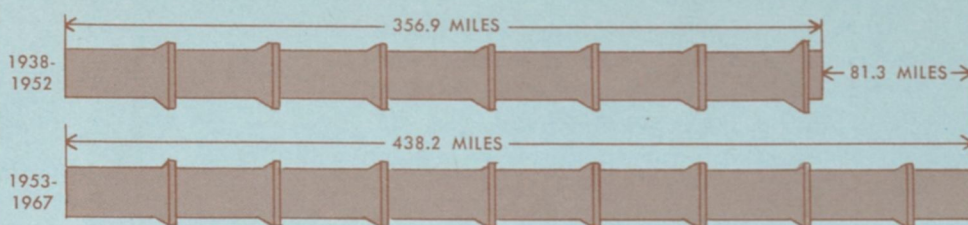
To meet the growing demand, these pipes were extended until 1852, when the City of Chicago purchased the company rights under a Legislative Act of February 15, 1851. City construction started with the use of cast iron water pipes. Thus, the water distribution system began to expand from the two miles of wooden mains to the more than 4,107 miles of pipe presently in use. The current figure does not include the suburban water system networks which receive water from the Chicago Water System.

Left—Worker bolting a tee in a section of large water main prior to its being lowered into place. Right—A new 36-inch gate valve is installed. The City's water system has over 42,000 valves in use for water distribution purposes.





MILES OF WATER CONSTRUCTED MAINS COMPARATIVE 15-YEAR PERIODS



The Water Distribution Division installed more than 17 miles of new water mains during 1967, of which 28 percent were pipes of 24 inches and larger in diameter. Approximately 42,200 feet of cast iron feeder mains, from 36 inches to 48 inches in diameter, were cleaned and lined with cement, a procedure which is known to increase the life expectancy greatly. The lining also increased the pipe capacity at least 44 percent. Some of these water mains had been in service for 60 years prior to this reconditioning. In the last fifteen years a total of \$89,816,487 was invested in capital improvements in the distribution system.

During 1967, plans were completed for the installation of a Telemetric Data Amassing System to provide for the collection of water pressure information from approximately 250 points in 4,107 miles of water pipe. Under the initial

state of this system, water pressure data will be collected at 32 locations selected as the most representative of the 250. This information will be transmitted over leased telephone lines to the Central Water Filtration Plant to be recorded graphically at the central control board. In the second step of this project, the balance of the collection points will be included to obtain facts for normal and off-normal pressure indicators. When the installation is completed, a push-button valve-control arrangement will make it possible to adjust pressures in the distribution system automatically to correct off-normal or otherwise unsatisfactory conditions. Ultimately, water flow information through the distribution system will be obtained through the same Telemetric channels. This Telemetric System has many advantages over the gauge-recording system because it will provide for speedier disposition of pressure com-

plaints and save staff time spent on investigation, collection and review of pressure charts. Furthermore, the location of the points from which the data will be collected can be selected more advantageously than under the system of recording-gauges.

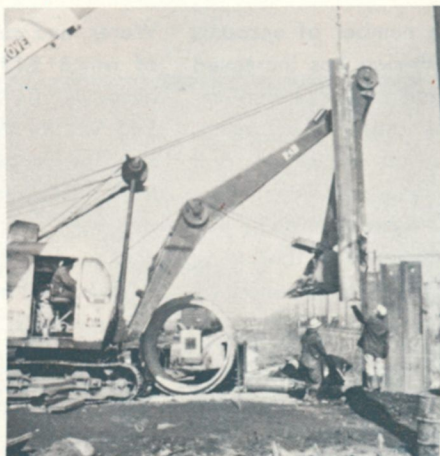
As a part of the continuing program to minimize the amount of water lost by underground leakage, a total of 1,611 miles of the distribution system was electronically monitored in 1967. By this means 1,195 leaks were located.

Plumbing inspectors made 4,877 first inspections during 1967; 3,375 re-inspections; 3,168 wrecked building inspections; 14,936 building permit and service pipe inspections; 2,818 meter inspections and 8,475 water contamination prevention inspections, all in the interest of preventing leakage while supplying safe, potable water.

Large, pre-stressed concrete water main being constructed. The distribution system has over 4,000 miles of water mains.



Workmen are driving steel sheeting in preparation for tunneling under a railway track to install a new water main.



The unusual photograph below shows how a concrete pipe is used to house and protect a water main running under a railway track.



The Water Meter Division is responsible for controlling, testing and repairing all meters in service. Meter data are recorded, and detailed inventory accounts of all meters and repair parts carried in stock are maintained. Meters were also tested at the manufacturing plants of the companies selling the meters, to insure compliance with specifications before they were shipped to the Division. This procedure has resulted in significant savings to the Department in terms of time, labor and shop equipment.

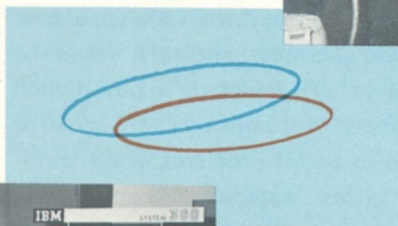
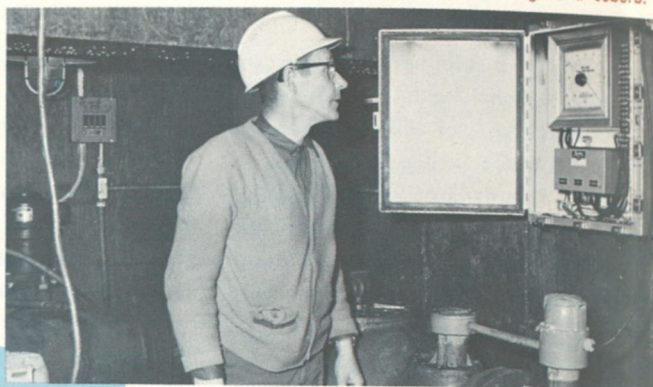
At the end of 1967, the number of water meters in service totaled 161,759. Of these, 2,051 were installed

during the year, including replacements. In that same period, the staff tested 17,558 meters, 16,260 of which had been reconditioned in the shop. In addition, 15,948 meters were repaired in the field at the sites of their installation.

Experiments involving fiber materials to be used in the construction of meter vaults were recently conducted. Tests have indicated that vaults constructed of this material will provide service equivalent to that given by those composed of the vitrified clay or concrete materials that had been used. The utilization of fiber materials is anticipated to cut material costs in half.

METERING

An engineer checks automatic recording, timing and flow-control valve in water main leading to a suburb.



The Collection Division's modern computer system has increased efficiency and speed in billing operations.

ASSESSING, BILLING AND COLLECTING

During the last fifteen years, the number of accounts serviced by the Water Collection Division has increased by 55,784. During this period, many changes and improvements have been made in the operations of assessing, billing and collecting. The conversion of billing and accounting procedures from the former electronic machine method to an IBM 360 computer system enables the Division to function with greater efficiency in the billing of water charges, and to obtain timely information on each customer account, or group of accounts, by type and area.

On December 31, 1967, the total number of accounts on the books of the Water Collection Division was 509,479.

Water fund collections for the year were \$55,104,117.57, of which \$43,442,100.82 were from the metered-rate accounts; \$11,444,549.32 from assessed-rate accounts; \$65,222.84 from sewer rental accounts for properties outside the corporate limits of Chicago; and \$152,244.59 from miscellaneous sources. An additional \$777,426.20 was collected for other funds.

Field men made 1,195,849 visits to properties to read water meters, 65,934 to make assessments and resolve complaints of allegedly excessive bills, leakage and misuses of water. An additional 52,305 visits to make collections of delinquent accounts resulted in the collection of \$620,263.52.



Educational tours are conducted for school children and adults at the Central Water Filtration Plant.



The "Supervisor's Workshop" is attended by 200 supervisors for monthly training classes on subjects vital to persons responsible for the safety, efficiency and general well being of employees while under their supervision.



During February of 1967, the Department's training program was expanded by the addition of a comprehensive supervisors training course. Participants are 200 supervisors from the various units of the Department of Water and Sewers. The subject matter for the courses of this program covers seven areas: leadership; cost reduction; training; safety and health; human relations; personnel advancement; and communications. The total group is separated into eight classes, each of which assembles for one full day each month for twelve months, with a four-month break during the summer. Since the program started in February of 1967, it will not be completed until the end of May, 1968. The summertime interruption will not decrease the total number of classes.

In-service training is another important method of increasing efficiency and job-interest. "Students" at the Central Water Filtration Plant are shown during a class discussion period.



Evaluation of the course, which is known as the "Supervisor's Workshop," at its intermediate stage indicated that it will be quite profitable to the participating employees.

Also, during 1967, many Departmental workers enrolled in classes offered by the Public Service Institute of the Chicago City College. Classes in work-related subjects provided academic and skill-improvement training.

Four key-position employees attended classes presented under the Trainers' Training Program, sponsored and conducted by the Civil Service Commission. The purpose of this program is to increase the participants' knowledge and skill in developing, conducting and evaluating training procedures.

Intensive on-the-job training was another important method of increasing efficiency of operating personnel. Other measures were the Operating Engineers Program, the West Shore Water Works Institute's Operator and Water Distribution Service Course, and participation by management and technical personnel in various workshop and seminar training courses.

While the City of Chicago Tuition Reimbursement Program, effective January 1, 1968, applies to all qualified City employees and is not restricted to Department of Water and Sewers, this Department has been encouraging its personnel to use this program to their direct advantage, which will also benefit the Bureaus of Water and Sewers. Under this tuition reimbursement procedure, up to seventy-five percent of college tuition costs will be refunded to City employees for successful completion of courses related to their work or probable future work. The college or university involved must be regionally accredited, and applications must be approved by the Head of the applicant's Department.

Under the Neighborhood Youth Corps program sponsored by the Chicago Committee on Urban Opportunity, youths were employed and instructed by the Department of Water and Sewers to function in various positions. This program is proving to be of value in training the young people in skills and the self-discipline required to hold a good post of employment.

Bureau of Sewers house drain inspectors receive instructions from supervisory personnel as they check accuracy of Drain Atlas records.



CITY OF CHICAGO

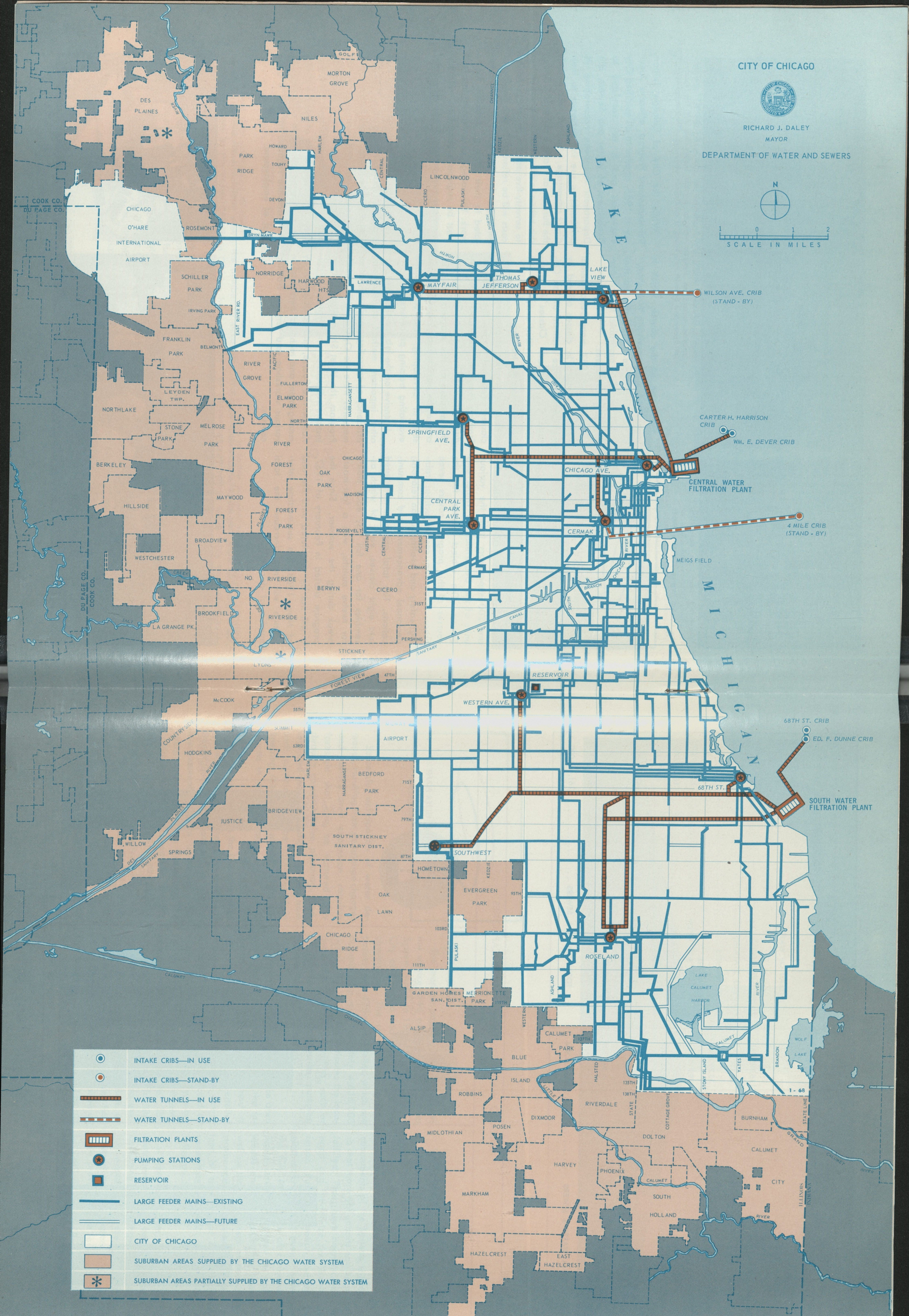


RICHARD J. DALEY
MAYOR

DEPARTMENT OF WATER AND SEWERS



1 0 1 2
SCALE IN MILES



- INTAKE CRIBS—IN USE
- INTAKE CRIBS—STAND-BY
- WATER TUNNELS—IN USE
- WATER TUNNELS—STAND-BY
- FILTRATION PLANTS
- PUMPING STATIONS
- RESERVOIR
- LARGE FEEDER MAINS—EXISTING
- LARGE FEEDER MAINS—FUTURE
- CITY OF CHICAGO
- SUBURBAN AREAS SUPPLIED BY THE CHICAGO WATER SYSTEM
- SUBURBAN AREAS PARTIALLY SUPPLIED BY THE CHICAGO WATER SYSTEM

THE CHICAGO WATER SYSTEM SERVICE AREA - 1967

DEPARTMENT OF WATER AND SEWERS

INVESTMENT IN CAPITAL IMPROVEMENTS 1953-1967

BUREAU OF WATER:

FILTRATION PLANTS	\$115,398,383
PUMPING STATIONS & MISC. ITEMS	45,719,455
WATER TUNNELS & CRIBS	33,350,302
WATER MAINS	89,816,487
TOTAL WATER	\$284,284,627

BUREAU OF SEWERS:

TOTAL SEWERS	\$138,847,339
TOTAL WATER & SEWERS	\$423,131,966

CAPITAL IMPROVEMENTS PROGRAM 1968-1972

BUREAU OF WATER:

FILTRATION PLANTS	\$ 14,120,000
PUMPING STATIONS	17,853,000
WATER TUNNELS	2,700,000
FEEDER MAINS:	
24" dia. and Larger	13,941,000
SMALL MAINS & MISC.	16,630,000
MISCELLANEOUS	1,771,000
TOTAL WATER	\$ 67,015,000

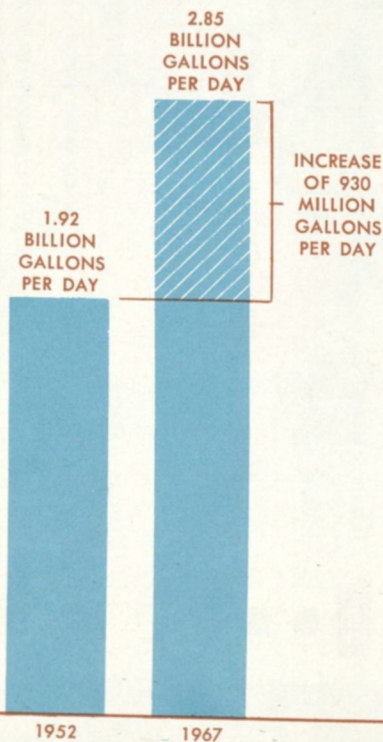
BUREAU OF SEWERS:

BOND PROGRAM—SEWERS	\$ 94,430,000
TOTAL WATER & SEWERS	\$161,445,000

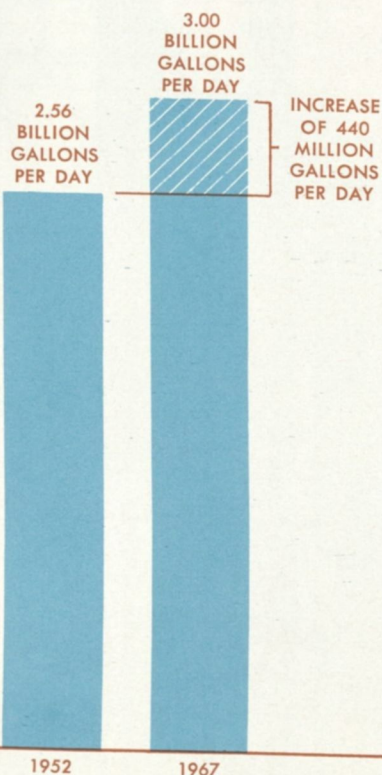
CHICAGO WATER SYSTEM—INSTALLED CAPACITIES 15-YEAR PERIOD



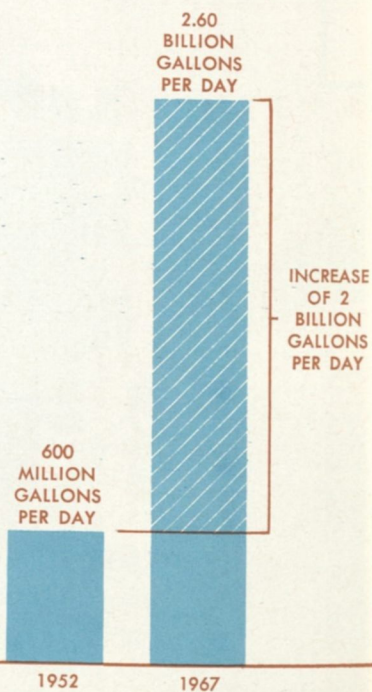
TUNNEL
CAPACITY



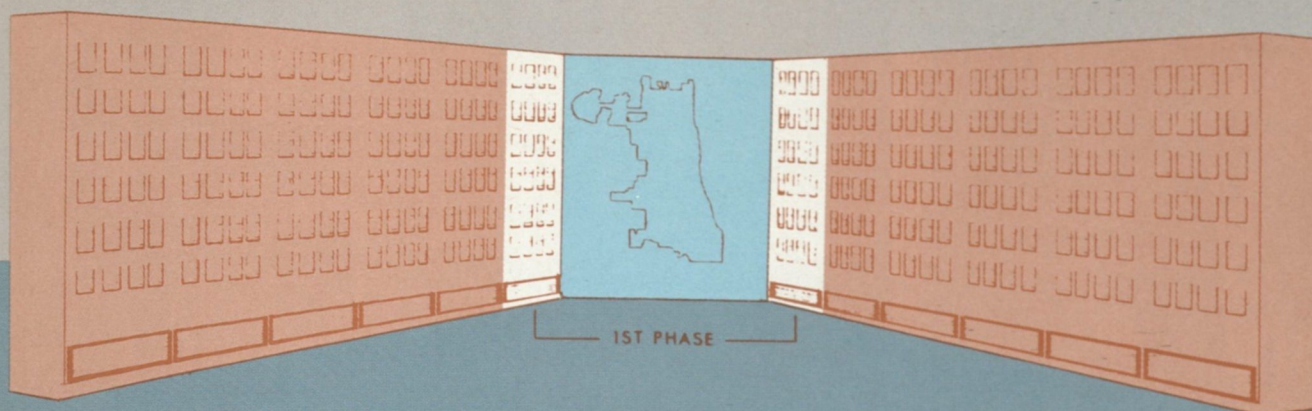
PUMP
CAPACITY



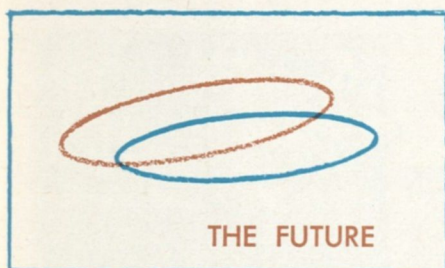
FILTER PLANT
CAPACITY
(Maximum)



TELEMETRIC DATA AMASSING SYSTEM



The installation of a Telemetric Data Amassing System in the water distribution network will provide for the collection of water pressure information from 250 points in 4,107 miles of water mains. The system is now in the first phase of its completion.



THE FUTURE

Successful anticipation of water demands, resulting from population changes and service area expansion, requires foresight that can be nurtured only through comprehensive planning. Findings and recommendations derived from such planning will be instrumental in keeping the System ahead of the demands in years to come.

In cooperation with the Department of Public Works and the Department of Development and Planning, a Capital Improvement Program is annually developed for the coming five years. The preliminary program prepared for the five-year period of 1968 to 1972 calls for an estimated expenditure of \$67,015,000 for improvements in the Water System's tunnels and shafts, filter plants, pumping stations and the water distribution system. The development of this program is based upon carefully detailed planning for the future.

The map on pages 12 and 13 shows the service area of the Chicago Water System, which in 1967 served the entire City of Chicago and sixty-six suburban communities. The service area encompasses some 425 square miles, which are occupied by approximately 4,636,000 people. The map also indicates the locations of major water facilities, such as filtration plants, intake cribs, pumping stations and water tunnels.

Following the map of the service area are three tables which illustrate the investment the City has made, and is currently planning to make, in capital improvements to the Water and Sewer Systems. The first table is a record of capital investments made, in type-of-facility arrangement, during the fifteen-year period from 1953 through 1967. The second table lists, by type of facility, the expenditures scheduled for improvements during the five-year period of 1968 through 1972. On the lower half of the page is a graphic presentation of the increase in installed capacities of the various facilities of the Chicago Water System.

While the fundamental functions of the Water and Sewer Systems are the supplying of potable water and the provision of adequate drainage, modernization and expansion of the various components of the Systems will continue so that those obligations can be properly fulfilled. Plans have been made to expand and modernize the Thomas Jefferson Pumping Station, whose four electrically-operated pumps have given the City forty years of continuous, reliable service. Changes in water demands and the distribution system, as well as the realignment of the pumping station areas, particularly that area serviced by the Mayfair Pumping Station, necessitate over-all changes in the Jefferson Station.

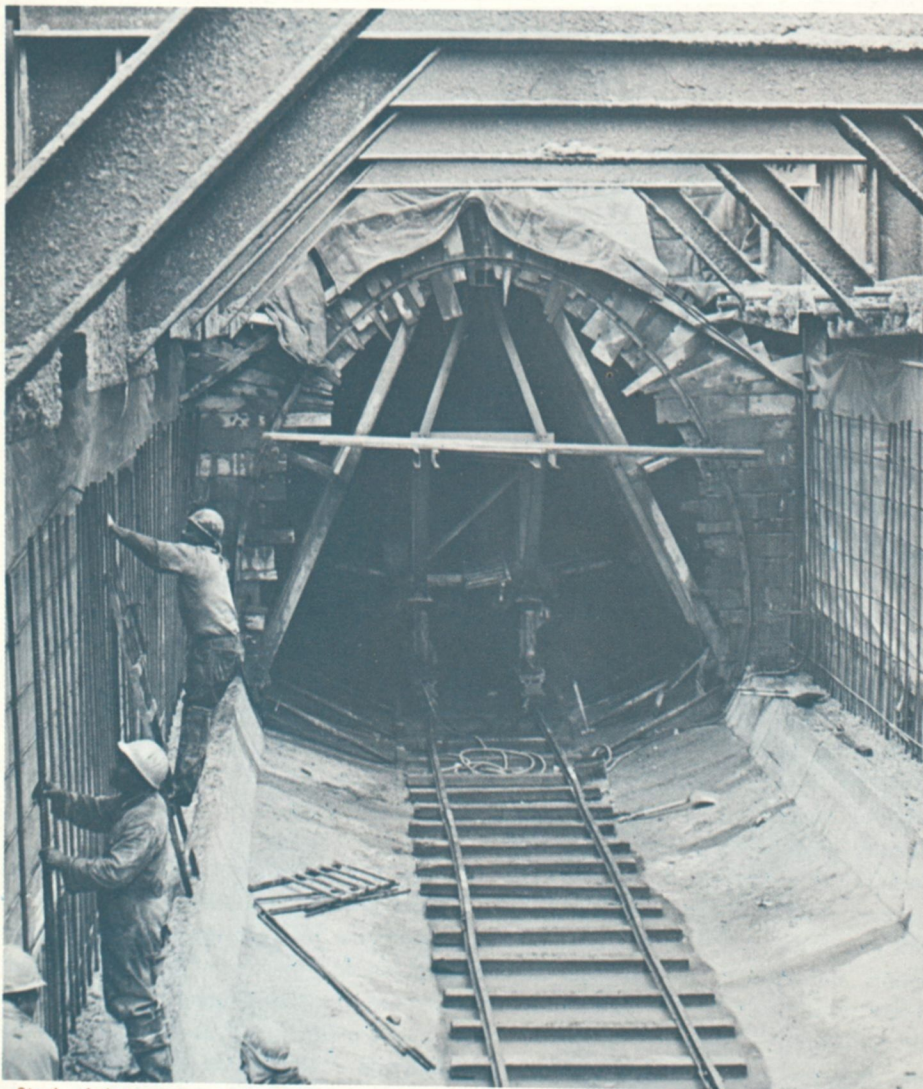
A consulting firm, retained by the Department, has begun a study to determine the changes and additions that would provide the most economical method for the Water System to continue providing high level service to the Chicago Metropolitan Area. This study will project demands that the System will be required to meet until the year 2000.



Section of 30-inch diameter sewer being set at Dickens Avenue near Melvina. In 1967, 32 miles of sewer of all sizes were constructed.



Sections of large, reinforced concrete sewer pipe were unloaded and are waiting to be placed into position in an open cut section blocked from view.



Steel girders were required for support while this huge sewer was under construction. Workmen are installing reinforcement rods before concrete is poured.



SEWERS

The history of Chicago is filled with dramatic events of achievement and progress. While this growth frequently provides the basis for discussion and published material, the subject of sewerage is usually discreetly avoided.

Less than 134 years have passed since Chicago Trustees authorized the expenditure of sixty dollars to drain State Street. This involved only the digging of trenches to channel storm water runoff into the Chicago River. Eventually, these trenches were replaced by wooden sewers with a triangular cross section.

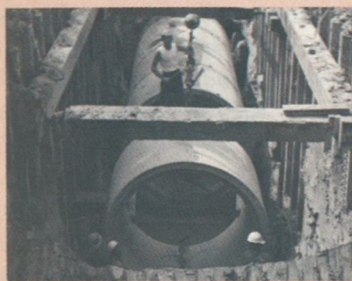
It is from this beginning that the present Sewerage System has developed. At the end of 1967, the Chicago Sewer System had grown to the vast drainage network that included 4,057 miles of sewer pipes, 146,036 manholes and 211,600 catch basins. In the last fifteen



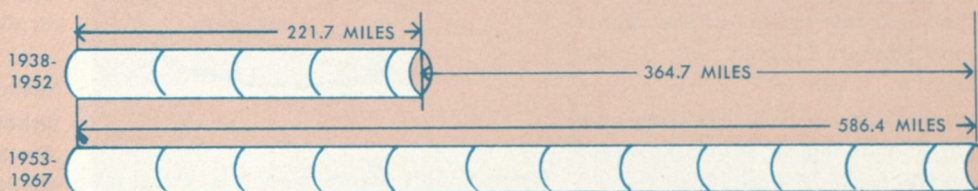
Inspectors are examining this mammoth 15-foot sewer curve at 35th Place and California Avenue.



Workers are rebuilding the brick arch of one of the sewers composing more than 4,057 miles of the existing sewer system.



MILES OF SEWERS CONSTRUCTED COMPARATIVE 15-YEAR PERIODS



years, a total of \$138,847,339 was invested in capital improvements for the system.

During the year, the Bureau of Sewers continued its efforts toward increasing efficiency in all administrative, engineering, inspection, construction, maintenance and repair operations by improved utilization of available manpower and modern equipment. Careful investigations were made, and will continue to be made, of main sewer blockages or rapid deterioration, in order to determine and eliminate the causes.

In addition to new sewers designed and constructed by the Department of Public Works in 1967, the Bureau of Sewers' engineering and day labor forces constructed six trunkline sewers, up to three and one-half feet in diameter, in various sections of the City.

Four smaller, but equally important additional sewer projects were also completed to provide relief from constant flooding problems.

The Bureau is now using a concrete saw to cut through street surfaces so that inspection, construction and minor sewer repairs can be made. The use of this equipment saves time in making street openings and releases compressors for more extensive major repair work. Also, radio communication coverage has been extended to the Bureau's trucks assigned to emergency activities, permitting greater coverage by these units, especially during the nights and over week-ends. All emergency units can now be reached without delay.

Effective operation of the Sewer System is partially dependent upon reliable current records. The Bureau of Sewers

maintains 31 sewer drain atlases, 13 sewer atlases, and hundreds of thousands of separate engineering and inspection drawings and reports, a complete documentation of the sewer system. During 1967, a program of drain atlas renewals was initiated. Some of these atlases are more than eighty years old, having been obtained from towns and villages that were annexed to the City of Chicago during its rapid growth. These records, subject to public inspection, were often in the need of revision and repair. Being aware that replacement of the atlas records by standard drafting methods would be a difficult project conducive to errors, the Bureau decided to reproduce the records photographically. With this process, the original pages can be preserved, while only the replaceable prints are inserted in the public atlases where they may be worn or damaged by frequent handling.



Left—rebuilding a catch basin and, right—repairing a tile sewer. During the year, 7,686 catch basins and 407 main sewer breaks were repaired.



The use of modern equipment expedites the excavation of a trench in preparation for laying a sewer.

During the year covered by this Report, construction was started on the Lawrence Avenue Underflow Sewer System designed by the Department of Public Works. This relief sewer is located in bedrock several hundred feet below the ground surface. During normal periods, drainage will continue to be collected by regular sewers and discharged into interceptors of the Metropolitan Sanitary District of Greater Chicago for treatment. During periods of extremely heavy flow, however, after the capacity of regular sewers has been reached because of storm flow, the excess runoff will be diverted into the new deep level sewer rather than overflow into the waterways. Thus, large quantities of storm water and sanitary drainage will be stored until the waste treatment plants of the Sanitary District are again

capable of treating the stored storm and sanitary flow. It has been revealed by computer analysis that the biochemical oxygen demand reaching the waterways during an average year due to storm overflow will be reduced by seventy-two percent in the area served by this new



SEWERS

system. This improvement is most important if the quality of the water in the Chicago River and the Canal System is considered.

One of the Bureau's responsibilities is the maintenance of a system of 365 standard, 33 substandard and 1,541

ordinary bench monuments, which are points of known elevation established for the use of architects, engineers and surveyors in determining correct elevations for new buildings, highways, sewers and other structures, both public and private. Standard bench monuments are composed of cylindrical columns of concrete, eight feet long and fifteen inches in diameter. They are buried in ground, and support a stainless steel pin, the elevation of which is precisely established. During 1967, the Bureau of Sewers Bench and Grade Section Engineers ran 138 miles of precise levels necessary to fix the elevation of 37 standard bench monuments and establish 64 new street grades.

When new sewers are connected to the City Sewer System, compliance with

Catch basins are cleaned by a clam shovel device known as an "orange peel." 311,754 catch basins were cleaned in 1967.



The Bureau of Sewers' scraping machines removed debris from 7,453,000 feet of sewers in 1967.



A water flusher truck in operation. This equipment is used to remove sewer blockages and to clean the lines.





A Bureau of Sewers employee checks for explosive gases prior to entering a manhole.

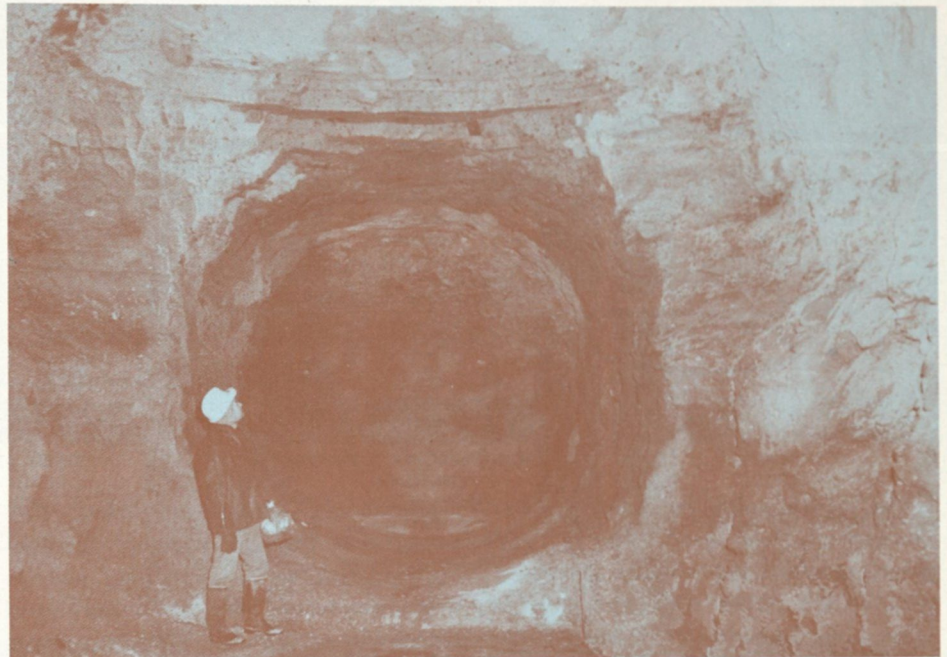


Maintenance engineers test sewage for acidity. Left—test is made outside through a manhole and, right—testing takes place in sewer pipe.

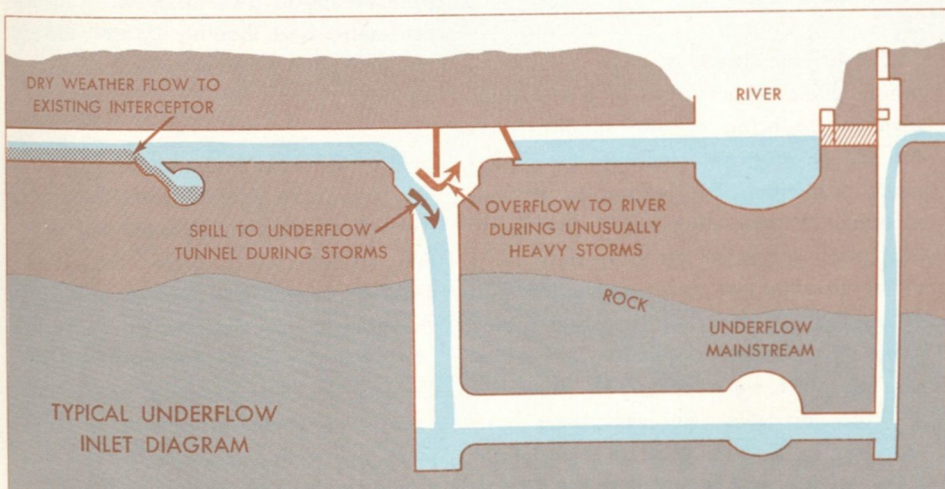


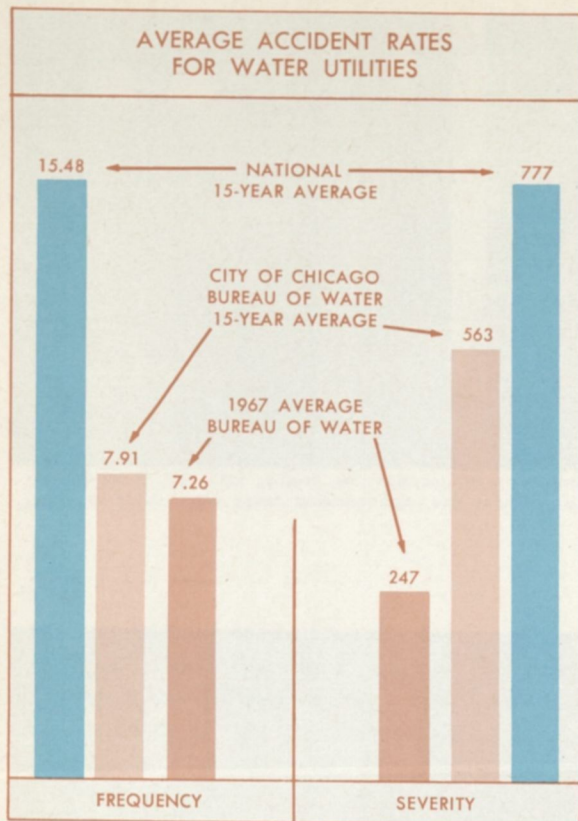
City standards is mandatory. Inspectors are assigned by the Bureau to see that all new sewer connections meet City specifications. Mason inspectors supervised the construction, public and private, of 32.2 miles of sewer varying in size from 10 inches in diameter to a semi-elliptical sewer with a height and width of 17 feet, and of 1,768 new catch basins and 1,576 new manholes.

During dry periods of the year, some material does settle at the bottom of the sewers. When this condition occurs, cleaning is necessary to prevent blockages. Cleaning and repair crews performed a variety of services during the year, including cleaning 311,754 catch basins, scraping 7,453,649 feet of sewer and repairing 407 main sewer breaks, 7,686 catch basins and 2,150 manholes.



The Lawrence Avenue Underflow Sewer System is located in bedrock several hundred feet below ground surface. The 17-foot tunnel, shown above, heads westward into the pilot tunnel. Below right, this head cutter is being used in constructing the Lawrence Avenue Underflow Sewer System.





SAFETY

The superb safety record of the Department of Water and Sewers in 1967 again manifests the wisdom of having adopted the formal safety program in 1954. This Department is one of the first municipal units of the large American cities to put into effect such a program for the purpose of reducing accidents injurious to employees, and to protect the public from hazards that might otherwise result from Departmental work activities in the field or in plant facilities.

The 1967 Annual Accident Data Report shows that the frequency rate for the Bureau of Water was 7.26, a little more than one-half of the latest published national average for water utilities. The severity rate of 247 was less than two-thirds of the national average rate for the same period.

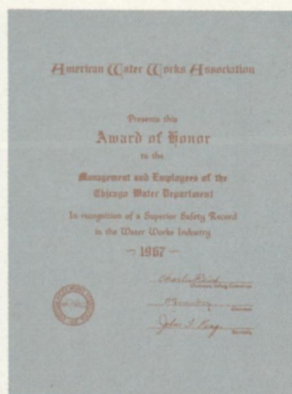
Such a record was achieved by intensive promotion. A Safety Committee, composed of representatives from the

Department's various operating divisions, held regular meetings throughout the year to discuss safety policies and procedures. Since the inception of the safety program, operating costs have benefited by the reduction of time lost because of accidents. Of greater value to the supervisory staff, however, is the significant decrease in needless human suffering.

Safety committees at lower organizational levels were active in the various divisions to bring greater emphasis on the safety program close to the actual work activities. For example, at the pumping stations, each month employees representing one of the three duty shifts were appointed as safety committeemen to see that all prescribed safety measures were being followed. During the year, all accidents were accurately reported by the divisions for recording and analysis, so that it could be determined how recurrences would be prevented.



Engineer, protected by a self-contained breathing apparatus, checks chlorine gas equipment.



The Department's superior safety record for 1967 was recognized with an Award of Honor by the American Water Works Association and an Award of Merit by the National Safety Council.

The importance of wearing safety equipment, such as hard hats, safety goggles and safety-toe shoes, was stressed. Special devices were available in locations where conditions warranted, and employees were instructed in their proper use. Safety bulletins, suggesting ways to avoid accidents at home, at work and while on vacation, were sent periodically to all employees of the Department, and monthly "Safety-Grams" were displayed conspicuously on bulletin boards.

The numerous National Safety Council and American Water Works Association Awards won by the Bureaus during their first fifteen years under the Department of Water and Sewers are further evidence of an outstanding safety record. The time and conscientious effort devoted by Departmental personnel to promoting, enforcing and following safe work practices are more than compensated for by the results attained.

DEPARTMENT OF WATER AND SEWERS

JAMES W. JARDINE
Commissioner of Water
and Sewers

ADMINISTRATIVE DIVISION

RICHARD A. PAVIA
Assistant Commissioner

BUREAU OF WATER

RAYMOND D. JOHNSOS
Deputy Commissioner
for Water
ROBERT O. WALLER
Chief Water
Engineer

BUREAU OF SEWERS

EDWARD A. QUIGLEY
Deputy Commissioner
for Sewers
THOMAS E. KILROE
Assistant Deputy
Commissioner
DAVID B. GOLDBERG
Chief Engineer
ARTHUR S. SALKIN
Assistant Chief
Engineer

ADMINISTRATIVE DIVISION

GENE J. BRADY
Ass't. to Deputy
Commissioner

WATER PURIFICATION DIVISION

J. C. VAUGHN
Engineer
N. J. DAVOUST
Assistant Engineer

WATER DISTRIBUTION DIVISION

J. T. GARRITY
General Superintendent
T. F. FOLEY
Ass't. General
Superintendent
W. R. LEMM
Engineer

ENGINEERING DIVISION

THOMAS C. BRESNAHAN
FRANK J. O'DONNELL
Engineers of
Sewer Construction
and Maintenance

DISTRICT CLEANING DIVISION

JOHN L. KILROE
Superintendent of
Sewer Cleaning

PUMPING STATION OPERATION DIVISION

NICHOLAS H. KUEHN
Engineer
ROBERT E. GLUCK
Assistant Engineer

WATER METER DIVISION

J. J. GILLERAN
Acting Superintendent

REPAIR & CONSTRUCTION DIVISION

WALTER KELLY
CHARLES R. MCCOY
Engineers of Sewer
Construction and Repair

INSPECTION DIVISION

EDWARD W. HALLAUER
Assistant Chief Engineer
of Sewers
JAMES H. RAINEY
Inspection Engineer

WATER COLLECTION DIVISION

EDWARD A. NIHILL
Superintendent
JOHN J. MALONE
Assistant Superintendent

ARTERIAL MAINTENANCE DIVISION

GEORGE T. WHITE
Superintendent
of Reconstruction

ADMINISTRATION AND FUNCTIONS

The Commissioner of Water and Sewers is the chief executive officer of the Department. Each of the two component Bureaus, the Bureau of Water and the Bureau of Sewers, is headed by a Deputy Commissioner.

The Bureau of Water is responsible for the operation and maintenance of the Chicago Water System which furnishes a good quality, filtered water to all of Chicago and 66 suburbs. The Bureau is composed of five Divisions: (1) the Purification Division which operates and maintains the two largest water treatment plants in the world and monitors the water supply to insure its potability; (2) the Pumping Station Operation Division which operates and maintains four water intake cribs and eleven pumping stations; (3) the Water Distribution Division which operates and maintains the water distribution system and constructs additional water mains as needed; (4) the Meter Division which operates the meter repair shop, installs large meters, inspects and makes repairs of meters in the field and maintains complete records on all meters,

and (5) the Collection Division which reads meters in service and bills, collects and accounts for water charges.

The Bureau of Sewers operates and maintains the Chicago Public Sewer System which collects and transports sanitary and industrial wastes and surface water drainage to the interceptor sewers of the Metropolitan Sanitary District of Greater Chicago. The Bureau is composed of the Administrative Division and five other Divisions: (1) the Engineering Division which plans and designs sewer extensions, betterments and major repairs; (2) the Cleaning Division which scrapes and flushes sewers and cleans catch basins on a district basis; (3) the Repair Division which makes repairs to the Sewer System on a district basis; (4) the Arterial Maintenance Division which cleans and repairs City arterial highway sewers, and (5) the Inspection Division which supervises sewer construction, the installation of connections and the underground work of others done near public sewers to protect the sewers from damage.

FINANCIAL STATEMENTS*—WATER WORKS FUNDS
BALANCE SHEET
 December 31, 1967

ASSETS

Fixed Assets:

Real Estate	\$ 1,983,234
Structures and Equipment	482,774,490
Less Reserve for Depreciation	84,232,969
Net Structures and Equipment	\$400,524,755
Work-in-Progress	20,627,418
Total Fixed Assets	\$421,152,173
Net Assets in Working Capital Funds	7,452,976
Cash for Repayment of Water Pipe Extension Certificates	293,760
Long Term Accounts Receivable	411,947

Current Assets:

Cash with City Treasurer, Revenue Fund	\$ 1,909,992
Cash with City Treasurer, Certificates Fund	15,365,716
Petty Cash	18,150
Water Accounts Receivable	4,907,491
Other Accounts Receivable	46,887
Due from Other Funds	2,717,692
Inventories	1,527,159
Total Assets	\$455,803,943

LIABILITIES AND CITY EQUITY

City of Chicago Equity\$278,755,253

Long Term Liabilities:

Certificates of Indebtedness	\$170,000,000
Advances in Aid of Construction	383,679
Water Pipe Extension Certificates	218,172
Total Long Term Liabilities	\$170,601,851

Current Liabilities:

Vouchers Payable from Revenue Fund	\$ 5,074,390
Vouchers Payable from Certificates Fund	23,714
Due Other Funds	22,619
Accrued Interest Payable on Long Term Debt	1,140,036
Other Current Liabilities	186,080

Total Current Liabilities\$ 6,446,839

Total Liabilities and City Equity\$455,803,943

*These statements represent a preliminary financial summary of the water funds and are not final.
 Final statements will be included in the City Comptroller's Report for 1967.

FINANCE

An analysis of the water fund cash flow discloses that the total cash receipts for 1967 amounted to \$57,032,806, while operating and maintenance disbursements of the Chicago Water System were \$39,971,139. Debt service costs, including interest and principal payments on certificates of indebtedness, totaled \$12,341,875. The remaining \$4,719,792 was available for investment in capital improvements.

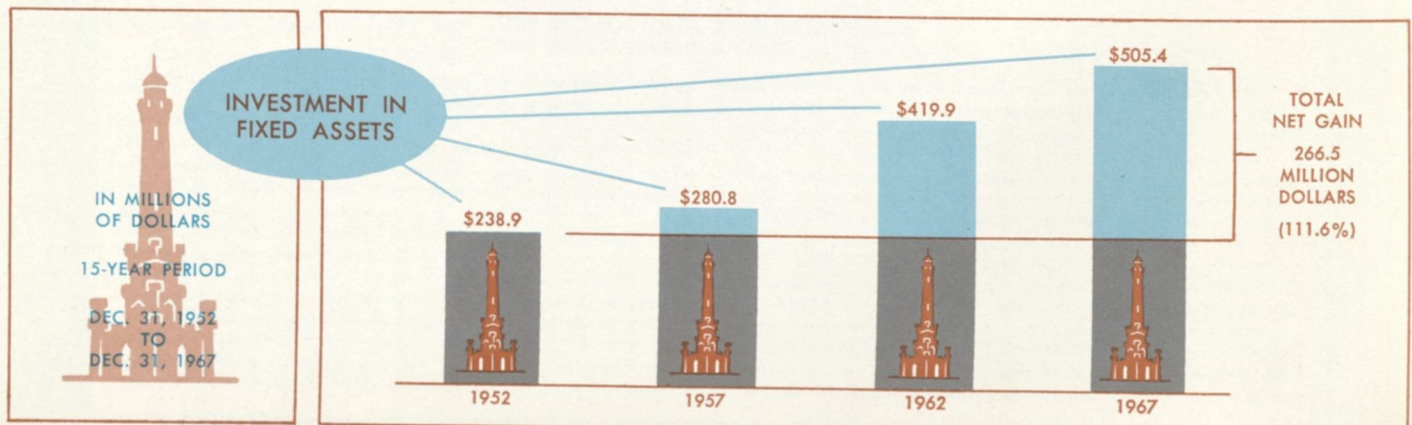
During the year, the total investment in fixed assets increased from 493.7 million dollars to 505.4 million dollars, which indicates a net growth of 11.7 million dollars. However, the replacement value of the Chicago Water System is estimated to be over one billion dollars.

The Chicago Water System is a self-supporting public utility. All operating and maintenance costs, debt service costs and all other expenses are paid with income from water charges. The System receives no support from taxes.

CAPITAL IMPROVEMENTS

A total of \$11,813,453 was invested in the Chicago Water System for the continuous improvement and development of facilities and equipment during 1967. Of this amount, \$4,719,792 was provided by current revenues. The Capital Improvements Program expenditures of the year included \$3,381,025 for filtration plant facilities, \$6,553,154 for construction of new water mains, \$233,156 for improvement of water tunnels and cribs, \$422,803 for the purchase of new equipment, and \$1,223,315 for the construction of improvements in the pumping stations, including the completion of the new remotely-controlled Lake View Station.

The preliminary Five-Year Capital Improvements Program for the Chicago Water System, which covers the period from 1968 to 1972, calls for the investment of \$67,015,000. This will include: \$2,700,000 for tunnels and shafts; \$14,120,000 for filtration plant improvements; \$17,853,000 for pumping stations; and \$32,342,000 for water main construction.



CASH RECEIVED FROM:

LARGE COMMERCIAL CONSUMERS	24.4%
\$13,918,849	
LARGE INDUSTRIAL CONSUMERS	16.5%
\$ 9,439,969	
SMALL CONSUMERS	14.9%
\$ 8,475,554	
SUBURBAN CONSUMERS	20.3%
\$11,607,729	
RESIDENTIAL (ASSESSED RATES) ..	20.1%
\$11,444,549	
ALL OTHER	3.8%
\$ 2,146,156	
TOTAL	100.0%
\$57,032,806	

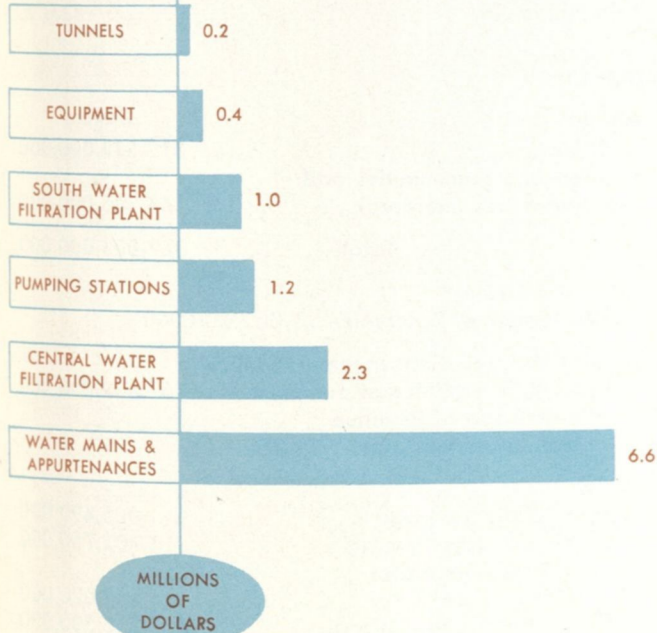
SOURCE AND USE OF 1967 WATER REVENUE FUNDS

CASH DEDICATED TO:

PURIFICATION	16.5%
PUMPING	13.0%
DISTRIBUTION	21.9%
ACCOUNTING & COLLECTING	5.4%
OTHER	13.3%
*OPERATING COSTS	70.1%
\$39,971,139	
*Administrative Costs Pro-rated to Direct Costs	
RETIREMENT OF LONG TERM DEBT ..	10.5%
INTEREST	11.1%
DEBT SERVICE	21.6%
\$12,341,875	
CASH USED IN CAPITAL IMPROVEMENTS	8.3%
\$ 4,719,792	
TOTAL	100.0%
\$57,032,806	

CAPITAL IMPROVEMENTS 1967

TOTAL \$11,813,453



INCOME STATEMENT Year Ended December 31, 1967

Operating Revenues:	
Sales of Water	\$ 55,943,413
Other Operating Revenues	592,141
Operations of Working Capital Funds	(581,947)
Total Operating Revenues	\$ 55,953,607
Operating Expenses Excluding Depreciation:	
Source of Supply	\$ 298,647
Power and Pumping	6,462,077
Purification	9,363,104
Transmission and Distribution	11,416,431
Maintenance	7,159,134
Customer Accounting and Collection	2,666,906
Administration and General	3,060,027
Total	\$ 40,426,326
Operating Income Before Depreciation	\$ 15,527,281
Add Non-Operating Income:	
Interest Earned	\$ 772,746
Rental of Real Estate	56,939
Other	9,464
Total Non-Operating Income	\$ 839,149
Sub-Total	\$ 16,366,430
Less Non-Operating Expense:	
Interest on Water Certificates	\$ 6,302,136
Less Interest Charged to Construction	626,795
Net Interest Expense	\$ 5,675,341
Other	69,573
Total Non-Operating Expense	5,744,914
Net Income Before Depreciation	\$ 10,621,516
Depreciation Expense	7,213,173
Net Income Carried to City Equity	\$ 3,408,343

STATEMENT OF CHANGE IN CITY EQUITY Year Ended December 31, 1967

City Equity January 1	\$275,346,889
Add:	
Net Income	\$ 3,408,343
Surplus Adjustment	21 3,408,364
City Equity December 31	\$278,755,253



1967 MAJOR WATER AND SEWER STATISTICS

SEWERS

Existing Sewer System

Miles of Sewer	4,057.82
Catch Basins	211,600
Manholes	146,036

1967 New Sewer Construction

Miles of Sewers—all sizes	32.20
Catch Basins	1,768
Manholes	1,576

Inspections..... 170,791

Complaints Handled..... 25,106

Repairs

Total Number of Sewer System Repair Jobs..	10,682
Main Sewer Breaks	407
Catch Basins	7,686
Manholes	2,150
Gutter Grates and Basin Outlets	439

Cleaning

Sewers Scraped—Feet	7,453,649
Catch Basins Cleaned	311,754

Street Grades Established and Approved by City Council

64

Standard Bench Monuments and Ordinary Benches Established

233

Receipts

House Drain Permit Fees	\$ 89,725
Other Permit Fees	63,228
Special Deposits	92,363
Out-of-Town Connection Fees	65,223
Drain Layers' License Fees	39,150
Total Receipts	\$ 349,689

WATER

Population and Area Served

(Based on Reliable estimates)

Population supplied:

Chicago (1960 U.S. Census 3,550,404) ...	3,551,000
Suburban (Year-end census as revised) ...	1,085,000

Total 4,636,000

Area served (in square miles):

Chicago	227
Sixty-six suburbs	198

Total 425

Per Capita Consumption

	Gallons Per Day
Chicago	241
Suburban	137
Average	217

Chemical and Physical Qualities of Water

Total hardness (as parts per million Calcium Carbonate)	136
Water temperatures: Intake (Central Water Filtration Plant)	
Average	48.0°F.
Maximum	71.0°F.
Minimum	32.0°F.

Pumpage

Annual	Gallons
Chicago	312,618,000,000
Suburban communities and industries (metered)	54,385,000,000
Total*	367,003,000,000

*(Amount through
Western Ave. Reservoir .. 1,062,000,000)

Annual Metered Consumption in Chicago
(50.4% † of Chicago pumpage) ... 157,432,000,000
†Percentage of Revenue
from Metered rates: 79.2%

Daily

Total daily average	1,005,490,000
Maximum day, June 15	1,402,750,000
Maximum hour (rate) June 15, 8:00 P.M.	1,852,000,000
Daily Average—Chicago	856,500,000
Daily Average—Suburban	149,000,000

WATER

Purity Control

Laboratory tests made:	
Bacteriological Laboratory	153,277
Microscopically for plankton	7,777
Chemical Laboratory	49,380
Electron Microscope	4,986
Control Laboratory S.W.F.P.	142,185
Control Laboratory C.W.F.P.	204,584
Total tests made ...	562,189

Bacteriological Results

Annual average coliform organisms per 100 ml*

	South District	North & Central District
Raw	260	160**
Plant outlet	0.002	0.0005
Pumping stations	0.00	0.004
Distribution system	0.012	0.009

*U. S. Public Health Service Standard for safe drinking water permits a maximum average of 1.0 coliform organisms per 100 ml

**Shore water only

Purification Treatment

	Gallons
Complete Filtration Treatment	393,656,000,000

Chemicals Applied—Tons

	Filtration Treatment		
	SWFP	CWFP	Pumping Stations*
Chlorine	1694	3016	—
Aluminum Sulfate (17% Al_2O_3) ..	4956	6818	—
Activated Carbon	2228	2328	—
Lime	3189	9170	—
Ferrous Sulfate (as $FeSO_4$)	2934	5871	—
Anhydrous Ammonia	133	—	—
Sodium Silicate	36	—	—
Hydrofluosilicic Acid (23%)	2600	4291	—
(As Fluorine)	472	781	—

*Supplemental chlorination applied at the six pumping stations in the North and Central Districts was discontinued March 21, 1967.

Supply

Crib intakes in service	2
Crib intakes on stand-by service	2
Shore intakes	2
Miles of water supply tunnels under lake and land (6 to 20 feet in diameter)	72.3

Pumping

Pumping stations	11
Pumps available for service	53
Installed pumping capacity (Million gallons per day)	2995

Annual Pumpage

	Million Gallons
By electrically driven pumps	149,292
By steam driven pumps	217,711
Total annual pumpage ..	367,003
Coal used by steam powered pumps (tons) ..	122,850
Electric power used by electrically powered pumps (kilowatt hrs.)	76,462,309

Distribution

Water Mains: (in miles)	
In use—December 31, 1967	4107.27
Extended	17.37
Abandoned	3.20
Net addition to system	14.17
Diameter of pipe (inches)	4 to 60
Fire Hydrants:	
In use—December 31, 1967	45,744
Installed	149
Abandoned	56
Net Increase	93
Gate Valves:	
In use—December 31, 1967	42,414
Installed	305
Abandoned	146
Net Increase	159
Pressure range in mains	
(lbs. per square inch)	28 to 58
Average pressure at curb	
(lbs. per square inch)	36
Miles of pipe tested for underground leakage ..	1,611.32
Premises inspected—house to house	
leakage survey	55,214
Repaired main breaks—4 inch	
to 36 inch in diameter	215

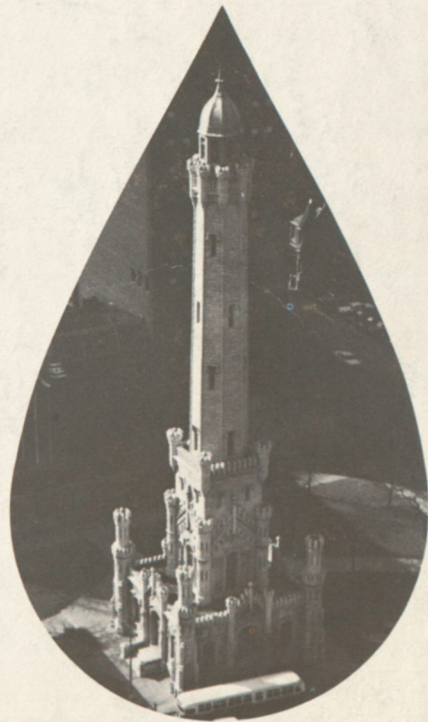
Meters

In service—December 31, 1967	161,754
Installed by Master Plumbers	1,273
Installed by Water Distribution Division	778
Total	2,051
Removed	1,784
Net Increase	267
Repaired on premises	15,948
Repaired in shops	16,260
Tested	17,558
Non-metered (assessed rate) services	347,725
Total Services (assessed & metered)	509,479

Supplements covering complete 1967 water or sewer statistics are available upon request.



ANNUAL REPORT • DEPARTMENT OF WATER AND SEWERS • CITY OF CHICAGO



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